Remote sensing based services to monitor vegetation dynamics in Kenya: the ENDELEO tool

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Ecosystems in East Africa have been changing significantly in the last decades.

Drivers of change include:
- population dynamics
- market forces
- climate change

Preventing further impact on these ecosystems in order to decrease the vulnerability to the naturally recurring drought in Eastern Africa.
Ecosystems play an important role in key sectors such as tourism, energy and agriculture. Therefore the conservation and sound management of natural heritage is of paramount importance.
There is an increased demand from ecosystem managers for updated information on the condition and the changes of the vegetation.

Frequently updated indicators derived from satellite images allow to monitor the vegetation status and understand the temporal dynamics.
Aim

- **Aim:**
  - Facilitating the access to regularly updated satellite derived information on environmental quality in East Africa
  - Lowering the barriers to its use

- The project focuses on rangelands and forests.
Aim

Rangelands
Aim

Forests

Five ‘water towers’:
Kenya’s water catchments
Aim

Objectives:

- Supply indicators suitable for forest and rangeland monitoring
- Lower the barrier for all stakeholders to use RS
- Enhance user involvement
- Ensure sustainability
Indicators

Product portfolio on two indicators:
- NDVI: indicative of vegetation health and density
- DMP: indicative of growth rate (kg DM/ha.day)

Product portfolio incorporates:
- Actual image
- Relative difference of current value with previous dekad
- Relative difference of current value with previous year
- Relative difference of current value with historical average
Indicators

- All data products are derived from SPOT-VEGETATION and Terra-MODIS sensors.
- Every 10 days the ENDELEO products are extracted from continental-scale imagery for both Kenya as well as a number of specific regions within Kenya.
Web tools

- Development of monitoring tool accessible to a broad group of users (endeleo.vgt.vito.be)
  - Easily interpretable products
  - Extensive help menu including help desk
  - Demonstration of use of tools in case studies
- Fully automatic
  - New data automatically added to the website on a 10 daily basis
Web tools

Context – Aim – Indicators – **Tools** – User involvement – Sustainability - Conclusion
Web tools

- Based on low resolution images (250 m – 1 km)
  - Image Viewer
Web tools

- Based on low resolution images (250 m – 1 km)
  - Image Viewer
  - Graph tool
Web tools

- Based on low resolution images (250 m – 1 km)
  - Image Viewer
  - Graph tool
  - Table tool

**Context – Aim – Indicators – Tools – User involvement – Sustainability - Conclusion**
Web tools
Web tools

- Based on high resolution images (15 m – 30 m)
  - Focus areas

![Focus Areas](image_url)

**FOCUS AREAS**

- **Focus area:** Mapbelt
- **Topic:** Land cover change
- **Sensor (acquisition date):** Landsat TM (09.01.1986), Landsat ETM+ (22.02.2000), Landsat ETM+ (10.02.2009), Landsat ETM+ (12.02.2009)
- **Projection:** UTM 31N, WGS84

**SELECT IMAGERY:**

- **Image type:**
  - False colour composite image
  - SWIR colour composite image
- **Select period:**
  - 1986 - 2000
  - 2010 - 2015
  - 2015 - 2019

**SELECT LAND COVER / LAND USE MAP:**

- 1999
- 2000

![Imagery](image_url)

**IMAGERY**

- 1986
- 2000
Web tools

Context – Aim – Indicators – Tools – User involvement – Sustainability - Conclusion
User involvement

- Stakeholder involvement has been important during all stages of the project in order to achieve the project goals.

- Interaction through
  - Online help desk
  - Case studies
  - Newsletters
  - Workshops
User involvement

- ENDELEO planning workshop (Nanyuki, Kenya, July 2007)
User involvement

ENDELEO user workshop (Nairobi, Kenya, April 2009)
User involvement

- ENDELEO promotion mission (Nairobi, Kenya, May 2010)
User involvement

- ENDELEO final workshop (Nairobi, Kenya, November 2010)
Sustainability

- To ensure sustainability the system is operated locally in Kenya.
- Mirror server installed at DRSRS, national focal point for RS and spatial information on natural resources.
- Close partnership established with AMESD (African Monitoring of the Environment for Sustainable Development) to ensure follow-up.
- Project fits in larger frame of RS initiatives for East Africa.
Conclusion

- ENDELEO has reached its main objectives
  - Facilitate the access to RS information useful for ecosystem managers in Kenya
  - Enabling stakeholders without expertise in RS to visualize the data and perform basic analyses
- 165 users, several of them showed vivid interest and closely followed up on the activities of ENDELEO.
- However, hands-on support is required!
THANK YOU FOR YOUR ATTENTION

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